Biology CP Grade 11
Name: Date:
Period: **Grade Received: ____/100 points total**

Genetics Unit Test

Multiple Choice (2 points each): *Choose the best answer (circle choice)*

1. According to Chargaff's rules, the amount of adenine in DNA equals the amount of ___ in DNA
    a. a. thymine
    b. b. cytosine
    c. c. uracil
    d. d. guanine

2. The frequency of crossing over between linked genes relates to the:
    a. a. type of allele it has
    b. b. sex of the person
    c. c. distance between the two genes
    d. d. distance between other chromosomes

3. How many chromosomes are found on a human karyotype of someone with a normal genome?
    a. a. 23
    b. b. 24
    c. c. 46
    d. d. 48

4. How many chromosomes exist in a gamete?
    a. a. 23
    b. b. 24
    c. c. 46
    d. d. 48

5. A breed of chickens exists where ones who are homozygous for the trait are either white or black, but heterozygotes are grey. What kind of dominance does the gene display?
    a. a. codominance
    b. b. incomplete dominance
    c. c. The black allele is dominant to the white allele
    d. d. The white allele is dominant to the black allele

6. A gene who is said to be _____ can suppress the display of a gene on a different locus.
    a. a. dominant
    b. b. epistatic
    c. c. incompletely dominant
    d. d. polygenic
    e.
7. RNA polymerase is the enzyme that carries out

a. a. transformation
b. b. transcription
c. c. translation
d. d. DNA replication

8. Which genetic disorder is associated with chromosome 21?
    a. a. Kleinfelter's Syndrome
    b. b. Turner Syndrome
    c. c. Down Syndrome
    d. d. Sickle Cell Anemia

9. Which genetic disorder results from a single x chromosome? The autosomes are normal.
    a. a. Kleinfelter's Syndrome
    b. b. turner Syndrome
    c. c. Down Syndrome
    d. d. Sickle Cell Anemia

10. The type of RNA that binds to certain amino acids is
    a. a. tRNA
    b. b. rRNA
    c. c. mRNA
    d. d. fRNA

11. Choose the proper order of processes:

I . mRNA binds to the ribosome
II. tRNA binds to the ribosome
III. mRNA is transcribed from template DNA in the nucleus
IV. adjecent amino acids join and tRNA floats away

    a. a. I, II, III, IV
    b. b. III, II, I, IV
    c. c. III, I, II, IV
    d. d. II, I, IV, III

12. A hemizygote is an individual who:
    a. a. lacks the locus for a gene entirely
    b. b. only has one copy of the gene
    c. c. has three copies of a gene
    d. d. doesn't know their genotype

Fill in the Blanks (1 pt each)

Mendel observed inheritance in _____ plants.

When cross pollinated, plants with different traits produced a _____.

The _____ trait is only seen in the absence of the _____ allele.

Your _____ is a result of your _____.

Short Problems/Responses: *Show all your work for full credit. Explain terms and concepts completely when/where applicable.*
(2 pts) Define heterozygous and homozygous individuals.

(2 pts) Mendel's Law of Independent Assortment was proven to have exceptions by what scientist? What species did he use to show this?

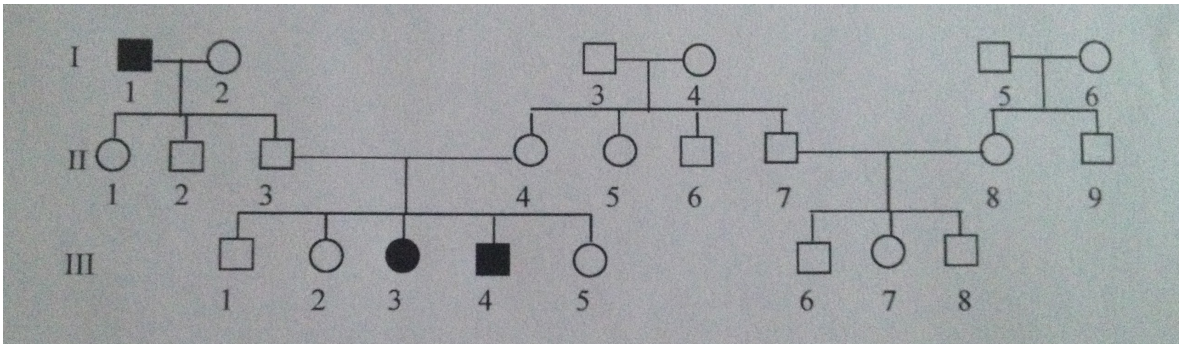
(6 pts) Given the sequence of DNA, TACGACATT, tell me
a. the complementary strand of DNA

b. the resulting strand of mRNA

c. the resulting amino acid sequence after translation (for this part you may use the genetic code diagram from lesson 3)

Extended Thought Problems: *these problems require higher levels of thinking and the ability to extend and apply knowledge from the unit that may not be readily apparent for question's topic. Be sure to fully explain your answer using key terms and concepts.*

(20 pts) Using this pedigree, answer the following questions.



For problems 1 - 4 identify the genotypes of the following individuals. (homozygous dominant, homozygous recessive, heterozygous) (1 pt each)

a. II 3 _____
b. III 4 _____
c. III 1 _____
d. I 2 _____

e. In the first couple (I 1 and I 2) who has the trait, the mother or the father? (3 pts)

f. Can any other individuals be carrying this trait? Why or why not? If so, who are they? (3 pts)

g. If you were asked to identify the mode of inheritance would you be more likely to answer that this pedigree indicates an autosomal recessive or a X-linked recessive disorder? Why? (5 pts)

h. Provide an example of a disorder that follows the mode of inheritance chosen above and describe its effects on a person's genome and how it is expressed. (5 pts)

(15 pts) What is the epigenome? How is it different from the genome? Provide specific examples of factors that may influence an individual's epigenome and how it changes their DNA. In what individuals might you most readily be able to see these changes? Can these changes be reversed?

(10 pts) In dogs, straight ears are dominant to floppy ears and black fur is dominant to brown. If you were to cross a heterozygous father (for both traits), with a brown, floppy-eared mother, what will be the resulting F1 generation? Complete a punnett square to show the resulting offspring.

What are the ratios of both genotypes and phenotypes?

If a 9:3:3:1 phenotypic ratio was observed in the F2 generation, what might the genotypes of the parents be?

(15 points) Choose to compare and contrast either transcription and translation OR DNA and RNA. Do not choose both. All key differences and similarities between the two should be included, as well as the overall significance of each process or molecule. You may want to include a diagram or drawing to enhance your response. Responses should be at least 5-7 sentences.